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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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*Ex parte* PATRICK DUVAUT and MASSIMO SORBARA

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Appeal 2009-0867
Application 10/626,714
Technology Center 2600

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Decided:[1] April 28, 2009

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Before MAHSHID D. SAADAT, JOHN A. JEFFERY, and CARLA M. KRIVAK, *Administrative Patent Judges*.

JEFFERY, *Administrative Patent Judge*.

DECISION ON APPEAL

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[1] The two-month time period for filing an appeal or commencing a civil action, as recited in 37 CFR § 1.304, begins to run from the decided date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

Appellants appeal under 35 U.S.C. § 134 from the Examiner's rejection of claims 1-28. We have jurisdiction under 35 U.S.C. § 6(b). We reverse. We also enter a new ground of rejection under 37 C.F.R. § 41.50(b).

## STATEMENT OF THE CASE

Appellants invented a digital subscriber line (DSL) communication system. The system provides a power spectral density (PSD) mask of a transmission. The mask is defined by a mathematical equation having constants and variables.[2] Claim 1 reads as follows:

1. A Digital Subscriber Line (DSL) communications system configured to provide a power spectral density (PSD) mask for spectral shaping of a dual bit map (DBM) mode downstream transmission, the PSD mask represented by an equation:

$$PSD_{DBMsOL} = K_{ADSL\_OL} \times \frac{C}{f_0} \times \frac{\left[\sin\left(\pi \frac{f}{f_0}\right)\right]^2}{\left(\pi \frac{f}{f_0}\right)^2} \times \frac{1}{1+\left(\frac{f}{f_{LP3dB}}\right)^{12}} \times \frac{1}{1+\left(\frac{f_{HP3dB}}{f}\right)^{6}}, \qquad 0 \prec f \prec \infty$$

where $PSD_{DBMsOL}$ represents the PSD mask, $K_{ADSL\_OL}$ represents a constant value, C represents a constant value, $f$ represents a frequency of the downstream transmission, $f_0$ represents a constant value, $f_{LP3dB}$ represents a 3 decibel (dB) low pass frequency and $f_{HP3dB}$ represents a 3 dB high pass frequency.

Claims 1-28 stand rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter (Ans. 3-4).

[2] *See generally* Spec. 5:21-7:3 and 28:11-30:2.

Rather than repeat the arguments of Appellants or the Examiner, we refer to the Briefs and the Answer[3] for their respective details. In this decision, we have considered only those arguments actually made by Appellants. Arguments which Appellants could have made but did not make in the Briefs have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii).

The Examiner finds claims 1-28 recite a non-statutory mathematical algorithm or equation of a DSL communications system that has no practical application (Ans. 3-4). Appellants argue: (1) the Examiner has not considered the claims as a whole, ignoring the positive recitation to a DSL communication system; (2) the claims are statutory in view of *In re Warmerdam*, 3 F.3d 1354 (Fed. Cir. 1994); and (3) the rejection is contrary to Office guidelines set forth in the Official Gazette Notice of November 22, 2005 (App. Br. 4-12; Reply Br. 1-3).

## ISSUE

Under § 101 , have Appellants shown the Examiner erred in rejecting claim 1 and finding that the recited DSL communications system is directed to non-statutory subject matter?

## FINDINGS OF FACT

The record supports the following findings of fact (FF) by a preponderance of the evidence.

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[3] Throughout this opinion, we refer to: (1) the Appeal Brief filed July 16, 2007; (2) the Examiner's Answer mailed October 17, 2007; and (3) the Reply Brief filed December 17, 2007.

1. Independent claims 1 and 15 recite a "Digital Subscriber Line (DSL) communications system." (Claim 1, l. 1; Claim 15, l. 1).

2. Claim 1 recites the DSL communication system is configured to provide a power spectral density (PSD) mask for spectral shaping a dual bit map (DBM) mode downstream transmission represented by the equation:

$$PSD_{DBMsOL} = K_{ADSL\_OL} \times \frac{C}{f_0} \times \frac{\left[\sin\left(\pi \frac{f}{f_0}\right)\right]^2}{\left(\pi \frac{f}{f_0}\right)^2} \times \frac{1}{1+\left(\frac{f}{f_{LP3dB}}\right)^{12}} \times \frac{1}{1+\left(\frac{f_{HP3dB}}{f}\right)^{6}}, \qquad 0 \prec f \prec \infty$$

where $PSD_{DBMsOL}$ represents the PSD mask, $K_{ADSL\_OL}$ represents a constant value, C represents a constant value, $f$ represents a frequency of the downstream transmission, $f_0$ represents a constant value, $f_{LP3dB}$ represents a 3 decibel (dB) low pass frequency and $f_{HP3dB}$ represents a 3 dB high pass frequency.

3. Claim 15 recites the DSL communication system is configured to provide a power spectral density (PSD) mask for spectral shaping a far end cross talk (FEXT) dual bit map (FBM) mode downstream transmission represented by the equation:

$$PSD_{FBMsOL} = K_{ADSL\_OL} \times \frac{C}{f_0} \times \frac{\left[\sin\left(\pi \frac{f}{f_0}\right)\right]^2}{\left(\pi \frac{f}{f_0}\right)^2} \times \frac{1}{1+\left(\frac{f}{f_{LP3dB}}\right)^{12}} \times \frac{1}{1+\left(\frac{f_{HP3dB}}{f}\right)^{8}}, \qquad 0 \prec f \prec \infty$$

where $PSD_{FBMsOL}$ represents the PSD mask, $K_{ADSL\_OL}$ represents a constant value, C represents a constant value, $f$ represents a frequency of the downstream transmission, $f_0$ represents a constant value, $f_{LP3dB}$ represents a 3 decibel (dB) low pass frequency and $f_{HP3dB}$ represents a 3 dB high pass frequency.

4. The Specification describes a DSL communications system may include a central office asynchronous digital subscriber line (ADSL) Terminating Unit (ATU-C) in bi-directional discrete multitone (DMT) communication with a remote ADSL Terminating Unit (ATU-R). (Spec. 7:5-18 and 7:28-8:11; Figs. 1-2).

5. The Specification describes a DSL communication system may include a central office High Speed ADSL Terminating Unit (HSTU-C) in bi-directional DMT communication with a remote High Speed DSL Terminating Unit (HSTU-R). (Spec. 8:26-9:12, 10:26-11:6, and 77:7-78:12).

## PRINCIPLES OF LAW

Section 101 of the Title 35 of the United States Codes states:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

35 U.S.C. § 101 (2002).

While the scope of patentable subject matter encompassed by § 101 is "extremely broad" and intended to "include anything under the sun that is made by man," it is by no means unlimited. *In re Comiskey*, 554 F.3d 967, 977 (Fed. Cir. 2009) (quoting *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980)). For example, laws of nature, abstract ideas, mental processes, and natural phenomena are excluded from patent protection. *Diamond v. Diehr*, 450 U.S. 175, 185 (1981); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972).

However, in determining the eligibility of a claim for patent protection under § 101, each claim must be considered as a whole. *See Diehr*, 450 U.S. at 188; *In re Alappat*, 33 F.3d 1526, 1543-44 (Fed. Cir. 1994). "If the claim preamble, when read in the context of the entire claim, recites limitations of the claim, or, if the claim preamble is 'necessary to give life, meaning, and vitality' to the claim, then the claim preamble should be construed as if in the balance of the claim." *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999).

## ANALYSIS

The preamble of independent claim 1 recites a "Digital Subscriber Line (DSL) communication system" (FF 1). Examining this preamble in the context of the entire claim, the body does not set forth the complete invention, and the limitation of the DSL communications system gives life and meaning to the claim. *See Pitney Bowes*, 182 F.3d at 1305; *see also Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1257 (Fed. Cir. 1989). A DSL communications system includes structure or apparatuses that specifically transmit data from one point to another using a digital subscriber line. The Specification also states that the system includes: (1) a remote ADSL Terminating Unit (ATU-R) in bi-directional DMT communication with the a central office ADSL Terminating Unit (ATU-C) or (2) a central office High Speed ADSL Terminating Unit (HSTU-C) in bi-directional DMT communication with a remote High Speed DSL Terminating Unit (HSTU-R) (FF 4-5). Thus, the recitation to a DSL

communication system in claim 1 is a structural limitation and encompasses a machine that falls into one of the classes eligible for patentability under 35 U.S.C. § 101.

Nonetheless, the mathematical algorithm exception to § 101 applies to true apparatus claims. *See Alappat*, 33 F.3d at 1542. Courts have routinely held that the mathematical subject matter alone is not entitled to patent protection since the claimed matter "represents nothing more than abstract ideas until reduced to some type of practical application." *Alappat*, 33 F.3d at 1543; *see also Diehr*, 450 U.S. at 191-92; *Parker v. Flook*, 437 U.S. 584, 594 (1978); *Benson*, 409 U.S. at 71-72. As previously stated, claim 1 recites a DSL communications system or a machine that provides a particular PSD mask defined by a mathematical formula or equation (FF 2). Additionally, just as in *Alappa*t, 33 F.3d at 1544 (emphasis added), claim 1 does not pre-exempt "the use of *any* apparatus employing the combination of mathematical calculations recited." The recited communications system is a particular machine that transmits data on a digital subscriber line. The claimed machine is, therefore, tailored to DSL applications. Moreover, the recited DSL communications system is programmed or configured to provide a PSD mask for spectral shaping a DBM mode downstream transmission defined by a specific equation (FF 2). Thus, the recited DSL communication system is not a general purpose computer but a particular or special purpose machine. *See Alappat*, 33 F.3d at 1545. When considering claim 1 as a whole, as Appellants argue (App. Br. 6 and 10), claim 1 recites more than a mathematical algorithm and is directed to a patent-eligible machine under 35 U.S.C. § 101.

Independent claim 15 is similar in scope to claim 1 (FF 1 and 3). Claim 15 differs from claim 1 with respect to the type of transmission the PSD mask spectrally shapes (i.e., an FBM mode downstream transmission) and the exponent for a ratio (i.e., the 3dB high pass frequency over the frequency of the downstream transmission) in the claimed equation (FF 3). Neither of these differences changes the scope of the claim 15 such that the claim no longer recites a particular machine for DSL applications. Thus, for the same reasons articulated above in connection with claim 1, we also find that the claim 15 is a patent-eligible machine under § 101.

Lastly, claims 2-14 and 16-28 depend from independent claims 1 and 15 and are also eligible for patentability under § 101.

For the foregoing reasons, Appellants have shown the Examiner erred in rejecting claims 1-28 under 35 U.S.C. § 101. Accordingly, we will not sustain the Examiner's rejection.

*New Ground of Rejection Under 37 C.F.R. § 41.50(b)*

Under 37 C.F.R. § 41.50(b), we enter new grounds of rejection for claims 1-28. Claims 1-28 are rejected under 35 U.S.C. § 112, first paragraph, as an improper single means claims or as purely functional. Claims 1-28 are also rejected under 35 U.S.C. § 112, second paragraph as being indefinite.

*1. 35 U.S.C. § 112, First Paragraph*

Independent claim 1 is rejected under 35 U.S.C. § 112, first paragraph, as an improper single means claim, or, alternatively, as purely

functional. Although claim 1 does not contain the word "means," the claim is interpreted as having a means-plus-function limitation under 35 U.S.C. § 112, sixth paragraph. The claim recites a "Digital Subscriber Line (DSL) communications system" (FF 1) configured to provide a specific PSD mask (FF 2). Other than the broadly recited DSL communications system or machine, this claim fails to recite any other structure to perform the recited function of providing the PSD mask for spectral shaping of a DBM mode downstream transmission. (*See* FF 1-2). Because the claim's sole functional limitation is not modified by sufficient structure, material, or acts for achieving the specified function, the phrase, "Digital Subscriber Line (DSL) communications system configured to provide a power spectral density (PSD) mask for spectral shaping of a dual bit map (DBM) mode downstream transmission" in claim 1 is considered a means-plus-function limitation under § 112, sixth paragraph.

As such, the means-plus-function limitation in claim 1 must be construed by "look[ing] to the specification and interpret[ing] that language in light of the corresponding structure, material, or acts described therein, and equivalents thereof, to the extent the specification provides such disclosure." *In re Donaldson Co., Inc.*, 16 F.3d 1189, 1193 (Fed. Cir. 1994) (en banc). However, since there is only one recited "means" (i.e., a means for providing a PSD mask for spectrally shaping a DBM mode downstream transmission) in claim 1, this claim is, in effect, a single means claim that is improper under 35 U.S.C. § 112, first paragraph. In essence, these claims cover *every conceivable means* for achieving the desired result (i.e., providing the PSD mask for spectrally shaping a DBM mode downstream transmission). The Specification, however, discloses only those means

known to Appellants (FF 4-5; Spec. 28:11-30:2) and does not enable everything within the scope of the claim. *See In re Hyatt,* 708 F.2d 712, 714 (Fed. Cir. 1983); s*ee also Ex parte Miyazaki*, No. 2007-3300, slip op. at 26-27 (BPAI Nov. 19, 2008) (precedential), *available at* http://www.uspto.gov/web/offices/dcom/bpai/prec/fd073300.pdf (noting the "*Halliburton* case remains viable for claims having purely functional language which is *unlimited* either by (1) the application of 35 U.S.C. § 112, sixth paragraph, or (2) the additional recitation of structure" (emphasis in original)). Consequently, independent claim 1 constitutes an improper single means claims.

Alternatively, even if claim 1 could somehow be construed as not containing means-plus-function limitations, it would still be unpatentable under § 112, first paragraph, as purely functional. *See Miyazaki*, slip op. at 26 ("[A]ny claim that includes purely functional claim language, and which is not subject to the limited construction under 35 U.S.C. § 112, sixth paragraph, fails to meet the requirements of 35 U.S.C. § 112, first paragraph…and thus is unpatentable."). As discussed above, the Specification does not describe every way of performing the recited function of providing a PSD mask for spectral shaping of a DBM mode downstream transmission recite in claim 1. Therefore, the claim fails to satisfy 35 U.S.C. § 112, first paragraph for lack of an enabling disclosure commensurate with the scope of the claim.

As we indicated previously, claim 15 is similar in scope to claim 1. Thus, claim 15 is likewise rejected under 35 U.S.C. § 112, first paragraph for the reasons discussed above in connection with claim 1 and 35 U.S.C.

§ 112, first paragraph. Claims 2-14 depend from claim 1, and claims 16-28 depend from claim 15. These claims recite merely values for the variables in the claimed equations and do not further limit the recited function. Thus, these claims are also rejected under 35 U.S.C. §112, first paragraph.

*2. 35 U.S.C. § 112, Second Paragraph*

Claims 1 and 15 are also indefinite under 35 U.S.C. § 112, second paragraph. The test for definiteness under 35 U.S.C. § 112, second paragraph is whether "those skilled in the art would understand what is claimed when the claim is read in light of the specification." *Orthokinetics, Inc. v. Safety Travel Chairs*, 806 F.2d 1565, 1576 (Fed. Cir. 1986) (citations omitted). In the context of a means-plus-function limitation, if one skilled in the art would be able to identify the structure, material, or acts for performing the claimed function, then the requirements of 35 U.S.C. § 112, second paragraph are satisfied. *See Atmel Corp. v. Info. Storage Devices, Inc.*, 198 F.3d 1374, 1381 (Fed. Cir. 1999); *see also In re Dossel*, 115 F.3d 942, 946-47 (Fed. Cir. 1997). If there is insufficient disclosure of the structure, material, or acts for performing the claimed function, however, a rejection under 35 U.S.C. § 112, second paragraph is appropriate. *See Donaldson*, 16 F.3d at 1195; *Biomedino, LLC v. Waters Tech. Corp.*, 490 F.3d 946, 952 (Fed. Cir. 2007).

In the present case, the corresponding structure for providing the PSD masks for spectral shaping of the downstream transmission in claims 1 and 15 are described as terminating units (FF 4-5). As explained above, this is insufficient disclosure of the structure or acts to perform the recited function. Thus, the Specification does not provide adequate corresponding structure or

acts or limit the scope of the claims to corresponding structure or acts that performs the function as required by § 112, sixth paragraph. Also, even if the claims were construed as not containing means-plus-function limitations, mere functional recitations, without more, do not distinctly claim the invention. Because we cannot determine the metes and bounds of claims 1 and 15, the claims are indefinite.

As dependent claims 2-14 and 16-28 do not further define the claim so that the metes and bounds can be determined, they are also indefinite under 35 U.S.C. § 112, second paragraph for the same reasons.

## CONCLUSIONS

(1) Appellants have shown the Examiner erred in finding that the recited DSL communication system is directed to non-statutory subject matter.

(2) We have entered a new ground of rejection for claims 1-28 under § 112, first paragraph or, alternatively, under § 112, second paragraph.

## ORDER

We reverse the Examiner's rejection of claims 1-28. We have, however, entered new grounds of rejection under 37 C.F.R. § 41.50(b) for claims 1-28 under 35 U.S.C. § 112, first and second paragraphs.

This decision contains a new ground of rejection pursuant to 37 C.F.R. § 41.50(b). 37 C.F.R. § 41.50(b) provides that "[a] new ground of rejection . . . shall not be considered final for judicial review."

37 C.F.R. § 41.50(b) also provides that the Appellants, WITHIN TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of the appeal as to the rejected claims:

> (1) *Reopen prosecution.* Submit an appropriate amendment of the claims so rejected or new evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the proceeding will be remanded to the examiner. . . .
>
> (2) *Request rehearing.* Request that the proceeding be reheard under § 41.52 by the Board upon the same record. . . .

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

REVERSED
37 C.F.R. § 41.50(b)

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